over the years without employing an accurate clock, this enables time measurement to be performed at high precision over a long period of time even after product shipment or after installing in an apparatus.

**[0148]** Note that in the above exemplary embodiment, an example has been illustrated in which the frequency correction amount corresponding to the change over the years is derived by increasing the frequency shift amount stored in the frequency shift amount register **78** for every year, in the series 1 times (0.6 ppm), 2 times (1.2 ppm), 3 times (1.8 ppm), and so on), however there is no limitation thereto. It is known that the change over the years in the oscillation frequency of oscillation circuits containing quartz oscillators are indications of the saturation characteristics. Thus the frequency shift amount for each year may be stored in advance in the frequency shift amount register **78** so as to match the saturation characteristics. For example, 0.6 ppm may be stored in the frequency shift amount register **78** as the frequency shift amount after 1 year but less than 2 years, 0.4 ppm may be stored as the frequency shift amount after 2 years but less than 3 years, 0.2 ppm may be stored as the frequency shift amount after 3 years but less than 4 years, and 0 ppm may be stored as the frequency shift amount after 4 years. In such cases, the control circuit **60** derives 0.6 ppm as the frequency correction amount corresponding to the change over the years after 1 year but less than 2 year, derives 1.0 ppm (0.6+0.4 ppm) as the frequency correction amount corresponding to the change over the years after 2 years but less than 3 years, and derives 1.2 ppm (1.0+0.2 ppm) as the frequency correction amount corresponding to the change over the years after 3 years. Moreover, the exemplary embodiment described above is an example in which the frequency correction amount corresponding to change over the years is changed each time 1 year elapses, however the frequency correction amount corresponding to the change over the years may be changed at longer or shorter intervals than 1 year.

**[0149]** Moreover, although in the above exemplary embodiment, at step S**506** the final frequency correction amount is computed by adding the frequency correction amount corresponding to the change over the years derived at step S**505** to the preliminary frequency correction amount stored in the frequency correction register **75**, there is no limitation thereto. FIG. **23** is a flow chart illustrating another mode of frequency correction processing according to the present exemplary embodiment.

**[0150]** At step S**601**, the control circuit **60** reads temperature measurement values and the frequency errors stored in the low temperature register **72**, the room temperature register **73** and the high temperature register **74**.

**[0151]** At step S**602**, the control circuit **60** derives a relationship equation (frequency-temperature characteristics) between temperature and frequency deviation in the oscillation circuit **61** based on the temperature measurement values and the frequency errors read at step S**601**. Namely, the control circuit **60** derives values of the a, $T_0$ and b by substituting the frequency errors and temperature measurement values read from each of the registers **72** to **74** as f and T in Equation (1), and thereby derives a relationship equation (frequency-temperature characteristics) between the temperature and the frequency deviation.

**[0152]** At step S**603**, the control circuit **60** derives the frequency shift amount corresponding to change over the years as a value obtained by multiplying the notified cumulative time from timer counter **83** by the frequency shift amount stored in frequency shift amount register **78**. For example, in a case in which the notified cumulative time from the timer counter **83** is less than one year, the control circuit **60** derives a frequency shift amount of 0 corresponding to the change over the years by multiplying the frequency shift amount (0.6 ppm) stored in the frequency shift amount register **78** by 0. However, when the cumulative time notified from the timer counter **83** is 1 year or more but less than 2 years, then the control circuit **60** multiplies the frequency shift amount (0.6 ppm) stored in the frequency shift amount register **78** by 1 to derive a frequency shift amount corresponding to the change over the years (0.6 ppm). Moreover, when the cumulative time notified from the timer counter **83** is 2 years or more but less than 3 years, then the control circuit **60** multiplies the frequency shift amount (0.6 ppm) stored in the frequency shift amount register **78** by 2 to derive the frequency shift amount corresponding to the change over the years (1.2 ppm).

**[0153]** At step S**604**, the control circuit **60** corrects the relationship equation derived at step S**602** using the frequency shift amount corresponding to change over the years derived at step S**603**. Namely, at step S**602**, since the relationship equation between temperature and frequency deviation derived at step S**602** does not include the change over the years, the control circuit **60** makes an overall shift in the quadratic curve of the frequency-temperature characteristics to reflect the component from change over the years by adding the frequency shift amount corresponding to the change over the years derived at step S**603** to the apex error b of the relationship equation derived at step S**602**.

**[0154]** At step S**605**, the control circuit **60** acquires the temperature measurement value of the temperature sensing device **27** and stores the acquired measurement value in the temperature measurement value register **71**.

**[0155]** At step S**606**, the control circuit **60** derives as a frequency correction amount a frequency deviation at the relevant temperature by substituting the temperature measurement value stored in the temperature measurement value register **71** into the relationship equation corrected at step S**604**, and stores this in the frequency correction register **75**.

**[0156]** At step S**607**, the control circuit **60** supplies correction data representing the frequency correction amount stored in frequency correction register **75** to the timer circuit **63**, and ends the current routine. The timer circuit **63** generates a timing signal that is the frequency of the output signal of the frequency divider circuit **62** corrected based on the correction data supplied from the control circuit **60**, and supplies these to the power consumption metering circuit **22** of the following stage (see FIG. **1**).

**[0157]** Note that it is possible to implement the frequency correction processing according to the present exemplary embodiment in a structure of any of the semiconductor devices **1** to **3** according to the first to the third exemplary embodiments.

## Sixth Exemplary Embodiment

**[0158]** FIG. **24** is a functional block diagram illustrating a configuration of a semiconductor device **6** according to a sixth exemplary embodiment of the present invention. The semiconductor device **6** differs from the semiconductor device **1** according to the first exemplary embodiment in the points that the semiconductor chip **30** includes an electrode pad **58** connected to an output terminal of the oscillation circuit **61**, and in that it is not provided with a measurement counter or a reference counter. The electrode pad **58** is con-